STRUCTURAL COMPOSITE LUMBER

Introduction

In recent years the increasing cost of timber and timber products has led to the development of various substitute materials. One such product is structural composite lumber, which is marketed commercially as an engineered wood product intended for use as a structural building material. Structural composite lumber (SCL) has been used for general building purposes, including limited use in falsework construction. The use of SCL as a falsework material is expected to increase in future years.

This memo sets forth Division of Structures policy with respect to the use of SCL as a falsework material on California highway construction projects.

General Information

Structural composite lumber is a natural wood product in which the harvested logs are debarked and either peeled or stranded. The resulting veneers or strands are then coated with adhesives and compressed to permanently bond the wood fibers. The finished product is a stronger, straighter and more homogeneous material than conventional lumber.

A recently issued ASTM specification (ASTM Designation: D 5456-93) covers test specimen qualification procedures, testing methods and procedures, evaluation of test results, and assignment of design values. The ASTM specification covers composite lumber products which meet the following definitions:

Structural composite lumber (SCL) is either laminated veneer lumber, laminated strand lumber or parallel strand lumber intended for structural use.

Laminated veneer lumber (LVL) is a composite of wood veneer sheet elements with wood fibers primarily oriented along the length of the member. Veneer thickness shall not exceed 0.25 inches.

Laminated strand lumber (LSL) is a composite of wood strand elements having a least dimension of approximately l/32 inch and a length of approximately 6 to 12 inches. The wood fibers in each strand are oriented primarily along the length of the member.

Parallel strand lumber (PSL) is a composite of wood strand elements with wood fibers primarily oriented along the length of the member. The least dimension of the strands shall not exceed 0.25 inches and the average length shall be a minimum of 150 times the least dimension.

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Typically, NDS dimension lumber sizes (2x4's, 4x4's, 2x6's, etc.) are manufactured from LVL composites, while PSL composites are used for the NDS timber sizes (5" x 5" and larger).

Allowable working stress values are obtained from strength tests on material specimens. Since SCL is a more uniform product than natural wood, the ASTM adjustment factors from which allowable working stresses are derived are considerably lower than the corresponding factors for wood. These lower adjustment factors result in higher design working stress values than are allowed for even the best grades of lumber.

Design stress values are a function of grade and wood species, and in some cases the depth and orientation of the member as well. The grade (quality) of a particular lot of material is determined by the modulus of elasticity. (Higher modulus values generally correlate with higher allowable design values.)

The ASTM specification covers procedures for evaluating specific material properties and for determining design values, including bending strength and stiffness, tensile strength parallel to the grain, compressive strength parallel and perpendicular to the grain, and horizontal and vertical shear, along with procedures for maintaining quality assurance in manufacturing. However, the specification expressly excludes determination of design values for connections.

Administration

Structural composite lumber is not covered by Section 51-1.06 of the Standard Specifications. However, the use of SCL will be permitted for falsework construction, as provided herein.

Structural composite lumber may be used for horizontal members; for vertical members except as noted in the following paragraph; for framing that supports sloping girders, deck overhangs and similar locations where dimension lumber would customarily be used; and for miscellaneous purposes such as cribbing, blocking and wedging.

Structural composite lumber may not be used as a post or column, or as diagonal bracing, in timber bents or towers.

Any intended use of structural composite lumber shall be indicated by a note on the falsework drawings. The note shall clearly identify the SCL members by grade (E value), species and type (e.g., 2.0E DF *Trade Name* LVL, or similar notation).

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Falsework drawings showing the use of SCL shall be accompanied by a technical bulletin, product data sheet, or similar publication issued by the manufacturer of the product. The technical data shown shall include tabulated working stress values for normal load duration and dry service conditions.

The falsework design shall be based on working stress values that are no higher than the manufacturer's tabulated working stress values. The tabulated values shall be adjusted as recommended by the manufacturer for member size or orientation; however, the tabulated values shall not be decreased for wet service conditions nor increased for short load duration.

When used as a horizontal load-carrying member, the calculated deflection due to the weight of concrete shall not exceed l/240 of the span.

Each piece of structural composite lumber shall be marked for identification. Identification markings shall show the wood species, material grade, manufacturer's name or identifying symbol, and date of manufacture or lot number.

The contractor shall furnish a certificate of compliance pursuant to the provisions in Section 6-1.07, Certificate of Compliance, of the Standard Specifications for each delivery of structural composite lumber to the work site. The certificate shall be signed by the supplier who furnishes the material. In the case of used material, the certificate shall be signed by the supplier from whom the contractor originally purchased the material. In either case, the certificate shall reference the contract number and shall identify the covered material by manufacturer and date of manufacture or lot number, or some other positive means of identification. In addition, the certificate shall state that:

- Qualification sampling and testing, test evaluation and assignment of design working stress values, independent inspection and quality assurance for the covered materials comply in all respects with ASTM Designation: D 5456.

- The covered materials are manufactured in a plant and by a process approved by _____ (Insert one of the following: National Evaluation Service, Inc.; Building Officials and Code Administrators International; ICBO Evaluation Service, Inc.; or Southern Building Code Congress International, Inc.)

Except as otherwise provided in this memo, all specification requirements and all Falsework Manual policy and procedures governing the use of timber falsework members shall apply to the use of structural composite lumber.